



**TestAmerica**

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

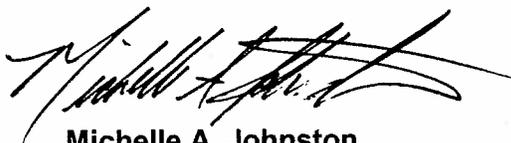
**ANALYTICAL REPORT**

**Perfluorocarbon (PFC) Analysis**

**Lot #: D9L180629**

**Dena Haverland**

**Dalton Utilities  
1200 V.D. Parrot Jr. Parkway  
Dalton, GA 30721**



**Michelle A. Johnston  
Project Manager**

**January 13, 2010**

## Case Narrative

### D9L180629

TestAmerica Denver utilizes USEPA approved methods in all analytical work. The samples presented in this report were analyzed for the parameters listed on the methods summary page in accordance with the methods indicated. Dilution factors and footnotes are provided on each datasheet to assist in the interpretation of the results.

The results relate only to the samples in this report and meet all requirements of NELAC. All data have been reviewed for compliance with the laboratory QA/QC plan and have found to be compliant with laboratory protocols with any exceptions noted below.

Please note that Non-Detect (ND) results have been evaluated down to the Method Detection Limit (MDL) and should be considered ND at the MDL. Unless otherwise noted, results for solids have been dry weight corrected.

This report shall not be reproduced except in full, without the written approval of the laboratory.

#### **Sample Arrival and Receipt**

The following report contains the analytical results for three samples received at TestAmerica Denver on December 18, 2009, according to documented sample acceptance procedures. The samples were received in good condition at a temperature of 2.2°C.

No anomalies were encountered during sample receipt.

#### **Standards**

Analytical standards were prepared using commercially available certified solutions containing all compounds of interest.

The mass labeled compounds 13C4 PFBA, 13C2 PFHxA, 18O2 PFHxS, 13C4 PFOA, 13C4 PFOS, 13C5 PFNA, 13C2 PFDA, 13C2 PFA, 13C2 PFUnA, 13C2 PFDoA, and D3 MeFOSA were introduced at the extraction step and were used for internal standards for the quantitation of the target compounds.

#### **Sample Extraction and Analysis**

The samples presented in this report were extracted for the target analytes by TestAmerica Denver's Standard Operating Procedure (SOP) DV-OP-0019 and analyzed for the target analytes by TestAmerica Denver's SOP DV-LC-0012.

#### **Method QC Samples**

The Method Blank is processed reagent water spiked with internal standard and prepared with each batch of 20 samples of the same matrix. The method blanks were non-detect at the reporting limits for the target analytes.

Each batch is prepared with low and mid level Laboratory Control Samples (LCS). The LCS recoveries for both levels were within established control limits.

#### **Analytical Comments**

Each sample is analyzed to achieve the lowest possible reporting limits within the constraints of the method. Due to high concentrations of target analytes, all three samples had to be analyzed at dilutions. The reporting limits have been adjusted relative to the dilutions required.



Lot #: D9L180629

The laboratory generated MS/MSD analyses associated with QC batch 9357165 exhibited spike compound recoveries, RPD data, and internal standard recoveries the control limits for several compounds. The acceptable low-level and mid-level LCS data indicated the analytical system was operating within control; therefore, corrective action is deemed unnecessary.

The Standard Operating Procedure (SOP) was altered slightly for these samples in the sample prep and LC conditions. The alterations are listed below.

Solvents are now the same as they were in the original SOP and run per the following gradient: From 0 to 11 minutes, the flow rate is 0.4 mL/minute and the MeOH ramps up from 25% to 100%. From 11 to 11.01 minutes, the flow rate increases to 0.7 mL/minute and this flow is diverted from the MS. At 13 minutes the flow rate decreases back down to 0.4 mL/minute and 25% MeOH. The column then equilibrates to 14 minutes.

PFTriA and PFTeA now use 13C2 PUnA as their internal standard instead of 13C2 PFDaA.

No other anomalies were observed.

## EXECUTIVE SUMMARY - Detection Highlights

D9L180629

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
<b>121609-01 12/16/09 13:45 001</b>				
Perfluorooctane sulfonamide (F 170	170	100	ug/kg	DEN -LC-0012
Perfluoroundecanoic acid (PFUn 430	430	100	ug/kg	DEN -LC-0012
Perfluorotetradecanoic acid (P 71 J	71 J	100	ug/kg	DEN -LC-0012
Perfluorododecanoic acid (PFDo 530	530	100	ug/kg	DEN -LC-0012
Perfluorotridecanoic acid (PFT 220	220	100	ug/kg	DEN -LC-0012
Perfluorobutanoic acid (PFBA) 11 J	11 J	41	ug/kg	DEN -LC-0012
Perfluoropentanoic acid (PFPA) 23 J	23 J	41	ug/kg	DEN -LC-0012
Perfluorohexanoic acid (PFHxA) 30 J	30 J	41	ug/kg	DEN -LC-0012
Perfluoroheptanoic acid (PFHpA) 17 J	17 J	41	ug/kg	DEN -LC-0012
Perfluorononanoic acid (PFNA) 44	44	41	ug/kg	DEN -LC-0012
Perfluorodecanoic acid (PFDA) 710	710	41	ug/kg	DEN -LC-0012
Perfluorobutane sulfonate (PFB 82	82	41	ug/kg	DEN -LC-0012
Perfluorooctanesulfonate 320	320	41	ug/kg	DEN -LC-0012
Perfluorooctanoic Acid 110	110	100	ug/kg	DEN -LC-0012
Percent Moisture 51	51	0.10	%	ASTM D 2216-90
<b>121609-02 12/16/09 14:23 002</b>				
Perfluorooctane sulfonamide (F 260	260	83	ug/kg	DEN -LC-0012
Perfluoroundecanoic acid (PFUn 280	280	83	ug/kg	DEN -LC-0012
Perfluorotetradecanoic acid (P 35 J	35 J	83	ug/kg	DEN -LC-0012
Perfluorododecanoic acid (PFDo 300	300	83	ug/kg	DEN -LC-0012
Perfluorotridecanoic acid (PFT 110	110	83	ug/kg	DEN -LC-0012
Perfluorobutanoic acid (PFBA) 15 J	15 J	33	ug/kg	DEN -LC-0012
Perfluoropentanoic acid (PFPA) 17 J	17 J	33	ug/kg	DEN -LC-0012
Perfluorohexanoic acid (PFHxA) 23 J	23 J	33	ug/kg	DEN -LC-0012
Perfluoroheptanoic acid (PFHpA) 20 J	20 J	33	ug/kg	DEN -LC-0012
Perfluorononanoic acid (PFNA) 39	39	33	ug/kg	DEN -LC-0012
Perfluorodecanoic acid (PFDA) 580	580	33	ug/kg	DEN -LC-0012
Perfluorobutane sulfonate (PFB 110	110	33	ug/kg	DEN -LC-0012
Perfluorooctanesulfonate 450	450	33	ug/kg	DEN -LC-0012
Perfluorooctanoic Acid 75 J	75 J	83	ug/kg	DEN -LC-0012
Percent Moisture 40	40	0.10	%	ASTM D 2216-90
<b>121709-01 12/17/09 14:40 003</b>				
Perfluorooctane sulfonamide (F 59 J	59 J	79	ug/kg	DEN -LC-0012
Perfluoroundecanoic acid (PFUn 110	110	79	ug/kg	DEN -LC-0012
Perfluorododecanoic acid (PFDo 99	99	79	ug/kg	DEN -LC-0012
Perfluorotridecanoic acid (PFT 57 J	57 J	79	ug/kg	DEN -LC-0012
Perfluorohexanoic acid (PFHxA) 15 J	15 J	31	ug/kg	DEN -LC-0012
Perfluorononanoic acid (PFNA) 25 J	25 J	31	ug/kg	DEN -LC-0012
Perfluorodecanoic acid (PFDA) 180	180	31	ug/kg	DEN -LC-0012

(Continued on next page)

# EXECUTIVE SUMMARY - Detection Highlights

D9L180629

<u>PARAMETER</u>	<u>RESULT</u>	<u>REPORTING LIMIT</u>	<u>UNITS</u>	<u>ANALYTICAL METHOD</u>
121709-01 12/17/09 14:40 003				
Perfluorobutane sulfonate (PFB	50	31	ug/kg	DEN -LC-0012
Perfluorooctanesulfonate	110	31	ug/kg	DEN -LC-0012
Perfluorooctanoic Acid	68 J	79	ug/kg	DEN -LC-0012
Percent Moisture	36	0.10	%	ASTM D 2216-90

# METHODS SUMMARY

D9L180629

<u>PARAMETER</u>	<u>ANALYTICAL METHOD</u>	<u>PREPARATION METHOD</u>
Method for Determination of Water Content of Soil	ASTM D 2216-90	ASTM D2216-90

## References:

ASTM      Annual Book Of ASTM Standards.

DEN      Severn Trent Laboratores, Denver, Facility Standard  
Operating Procedure.

# METHOD / ANALYST SUMMARY

D9L180629

<u>ANALYTICAL METHOD</u>	<u>ANALYST</u>	<u>ANALYST ID</u>
ASTM D 2216-90	Braden H. Peterson	006733
DEN -LC-0012	Teresa L. Williams	002510

## References:

ASTM      Annual Book Of ASTM Standards.

DEN      Severn Trent Laboratores, Denver, Facility Standard  
Operating Procedure.

# SAMPLE SUMMARY

D9L180629

<u>WO #</u>	<u>SAMPLE#</u>	<u>CLIENT SAMPLE ID</u>	<u>SAMPLED DATE</u>	<u>SAMP TIME</u>
LRDL5	001	121609-01	12/16/09	13:45
LRDL6	002	121609-02	12/16/09	14:23
LRDL7	003	121709-01	12/17/09	14:40

**NOTE(S) :**

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Dalton Utilities

Client Sample ID: 121609-01

HPLC

Lot-Sample #....: D9L180629-001 Work Order #....: LRDL51AA Matrix.....: SOLID  
 Date Sampled....: 12/16/09 13:45 Date Received...: 12/18/09  
 Prep Date.....: 12/23/09 Analysis Date...: 01/09/10  
 Prep Batch #....: 9357165 Analysis Time...: 10:26  
 Dilution Factor: 10  
 % Moisture.....: 51 Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Perfluorooctane sulfonamide (FOSA)	170	100	ug/kg	25
Perfluoroundecanoic acid (PFUnA)	430	100	ug/kg	37
Perfluorotetradecanoic acid (PFTeA)	71 J	100	ug/kg	30
Perfluorododecanoic acid (PFDoA)	530	100	ug/kg	17
Perfluorotridecanoic acid (PFTrIA)	220	100	ug/kg	23
Perfluorobutanoic acid (PFBA)	11 J	41	ug/kg	6.9
Perfluoropentanoic acid (PFPA)	23 J	41	ug/kg	18
Perfluorohexanoic acid (PFHxA)	30 J	41	ug/kg	4.1
Perfluoroheptanoic acid (PFHpA)	17 J	41	ug/kg	15
Perfluorononanoic acid (PFNA)	44	41	ug/kg	10
Perfluorodecanoic acid (PFDA)	710	41	ug/kg	15
Perfluorobutane sulfonate (PFBS)	82	41	ug/kg	17
Perfluorohexane sulfonate (PFHxS)	ND	41	ug/kg	16
Perfluorooctanesulfonate	320	41	ug/kg	7.7
Perfluorooctanoic Acid	110	100	ug/kg	21

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
13C4 PFOA	100	(50 - 200)
13C4 PFOS	94	(50 - 200)
13C4 PFBA	87	(50 - 200)
13C2 PFHxA	90	(50 - 200)
18O2 PFHxS	97	(50 - 200)
13C5 PFNA	97	(50 - 200)
13C2 PFDA	93	(50 - 200)
13C2 PFUnA	94	(50 - 200)
13C2 PFDoA	83	(50 - 200)
MeFOSA	97	(50 - 200)

NOTE (S) :

Results and reporting limits have been adjusted for dry weight.  
 J Estimated result. Result is less than RL.

Dalton Utilities

Client Sample ID: 121609-02

HPLC

Lot-Sample #....: D9L180629-002    Work Order #....: LRDL61AA    Matrix.....: SOLID  
 Date Sampled....: 12/16/09 14:23    Date Received...: 12/18/09  
 Prep Date.....: 12/23/09    Analysis Date...: 01/09/10  
 Prep Batch #....: 9357165    Analysis Time...: 10:56  
 Dilution Factor: 10  
 % Moisture.....: 40    Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Perfluorooctane sulfonamide (FOSA)	260	83	ug/kg	21
Perfluoroundecanoic acid (PFUnA)	280	83	ug/kg	30
Perfluorotetradecanoic acid (PFTEA)	35 J	83	ug/kg	24
Perfluorododecanoic acid (PFDoA)	300	83	ug/kg	14
Perfluorotridecanoic acid (PFTria)	110	83	ug/kg	19
Perfluorobutanoic acid (PFBA)	15 J	33	ug/kg	5.7
Perfluoropentanoic acid (PFPA)	17 J	33	ug/kg	15
Perfluorohexanoic acid (PFHxA)	23 J	33	ug/kg	3.4
Perfluoroheptanoic acid (PFHpA)	20 J	33	ug/kg	12
Perfluorononanoic acid (PFNA)	39	33	ug/kg	8.3
Perfluorodecanoic acid (PFDA)	580	33	ug/kg	13
Perfluorobutane sulfonate (PFBS)	110	33	ug/kg	14
Perfluorohexane sulfonate (PFHxS)	ND	33	ug/kg	13
Perfluorooctanesulfonate	450	33	ug/kg	6.3
Perfluorooctanoic Acid	75 J	83	ug/kg	17

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
13C4 PFOA	94	(50 - 200)
13C4 PFOS	86	(50 - 200)
13C4 PFBA	83	(50 - 200)
13C2 PFHxA	84	(50 - 200)
18O2 PFHxS	94	(50 - 200)
13C5 PFNA	96	(50 - 200)
13C2 PFDA	86	(50 - 200)
13C2 PFUnA	87	(50 - 200)
13C2 PFDoA	77	(50 - 200)
MeFOSA	97	(50 - 200)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.  
 J Estimated result. Result is less than RL.

Dalton Utilities

Client Sample ID: 121709-01

HPLC

Lot-Sample #....: D9L180629-003    Work Order #....: LRDL71AA    Matrix.....: SOLID  
 Date Sampled....: 12/17/09 14:40    Date Received...: 12/18/09  
 Prep Date.....: 12/23/09    Analysis Date...: 01/09/10  
 Prep Batch #....: 9357165    Analysis Time...: 11:11  
 Dilution Factor: 10  
 % Moisture.....: 36    Method.....: DEN -LC-0012

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Perfluorooctane sulfonamide (FOSA)	59 J	79	ug/kg	19
Perfluoroundecanoic acid (PFUnA)	110	79	ug/kg	29
Perfluorotetradecanoic acid (PFTeA)	ND	79	ug/kg	23
Perfluorododecanoic acid (PFDoA)	99	79	ug/kg	13
Perfluorotridecanoic acid (PFTria)	57 J	79	ug/kg	18
Perfluorobutanoic acid (PFBA)	ND	31	ug/kg	5.4
Perfluoropentanoic acid (PFPA)	ND	31	ug/kg	14
Perfluorohexanoic acid (PFHxA)	15 J	31	ug/kg	3.2
Perfluoroheptanoic acid (PFHpA)	ND	31	ug/kg	11
Perfluorononanoic acid (PFNA)	25 J	31	ug/kg	7.9
Perfluorodecanoic acid (PFDA)	180	31	ug/kg	12
Perfluorobutane sulfonate (PFBs)	50	31	ug/kg	13
Perfluorohexane sulfonate (PFHxS)	ND	31	ug/kg	12
Perfluorooctanesulfonate	110	31	ug/kg	5.9
Perfluorooctanoic Acid	68 J	79	ug/kg	16

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
13C4 PFOA	118	(50 - 200)
13C4 PFOS	107	(50 - 200)
13C4 PFBA	102	(50 - 200)
13C2 PFHxA	104	(50 - 200)
18O2 PFHxS	116	(50 - 200)
13C5 PFNA	116	(50 - 200)
13C2 PFDA	114	(50 - 200)
13C2 PFUnA	119	(50 - 200)
13C2 PFDoA	102	(50 - 200)
MeFOSA	118	(50 - 200)

NOTE(S) :

Results and reporting limits have been adjusted for dry weight.  
 J Estimated result. Result is less than RL.

Dalton Utilities

Client Sample ID: 121609-01

General Chemistry

Lot-Sample #....: D9L180629-001    Work Order #....: LRDL5    Matrix.....: SOLID  
Date Sampled....: 12/16/09 13:45    Date Received...: 12/18/09  
% Moisture.....: 51

<u>PARAMETER</u>	<u>RESULT</u>	<u>RL</u>	<u>UNITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
Percent Moisture	51	0.10	%	ASTM D 2216-90	12/22/09	9356080
		Dilution Factor: 1		Analysis Time...: 13:00	MDL.....: 0.0	

Dalton Utilities

Client Sample ID: 121609-02

General Chemistry

Lot-Sample #...: D9L180629-002    Work Order #...: LRDL6    Matrix.....: SOLID  
Date Sampled...: 12/16/09 14:23    Date Received...: 12/18/09  
% Moisture.....: 40

<u>PARAMETER</u>	<u>RESULT</u>	<u>RL</u>	<u>UNITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
Percent Moisture	40	0.10	%	ASTM D 2216-90	12/22/09	9356080
		Dilution Factor: 1		Analysis Time...: 13:00	MDL.....: 0.0	

Dalton Utilities

Client Sample ID: 121709-01

General Chemistry

Lot-Sample #...: D9L180629-003    Work Order #...: LRDL7    Matrix.....: SOLID  
Date Sampled...: 12/17/09 14:40    Date Received...: 12/18/09  
% Moisture.....: 36

<u>PARAMETER</u>	<u>RESULT</u>	<u>RL</u>	<u>UNITS</u>	<u>METHOD</u>	<u>PREPARATION- ANALYSIS DATE</u>	<u>PREP BATCH #</u>
Percent Moisture	36	0.10	%	ASTM D 2216-90	12/22/09	9356080
		Dilution Factor: 1		Analysis Time...: 13:00	MDL.....: 0.0	